NOTES ON AUSTRALIAN SAWFLIES (*TENTHREDINIDÆ*).

By Walter W. Froggatt, F.L.S., Government Entomologist.

The Sawflies are well represented in Australia by a number of handsome insects belonging to very distinctive genera peculiar to our insect-fauna.

While enormous numbers of the gregarious larvæ of several species of the genus *Perga* are common at certain seasons (March and April in particular), feeding upon the foliage of young gum-trees (*Eucalyptus*) wherever there is plenty of young growth, the perfect insects are comparatively rare. In breeding-out specimens from the pupæ, one finds that a large percentage of them never reach maturity, because they are attacked in the larval stage by many dipterous and hymenopterous parasites which develop after the sawflies have pupated. A great number also fall victims to a mould-fungus, which destroys them in the cocoons.

Perga dorsalis Leach : The Steel-Blue Sawfly.

Zoological Miscellany, iii., p.117, t.148, fig.1, 1817.

This handsome sawfly, one of the largest and best known species of the typical Australian genus *Perga*, has an extended range round the coast, and is common in Victoria and New South Wales.

The gregarious larvæ feed at night, and rest during the day, clustered together in an oval mass, on the stem of the gum-tree upon which they are feeding. When disturbed, they exude a sticky yellow substance from the mouth, at the same time raising the tip of the body, and tapping it down on the foliage. The leaves are devoured from the top of the young gum-trees; and, when the larvæ are full fed, they crawl down the stem to pupate. I have found them fully developed in the middle of April; but,

when they descend from their resting-place, they wander about over the grass for several days before they finally select a place in which to pupate, generally the softer soil against a tree-trunk. Into this they burrow to a depth of three or four inches, massing their large, oval cocoons in rows, one against the other. I watched several large swarms feeding upon the Peppermint-gums (*Eucalyptus novæ-angliæ*) at our Experiment Station at Uralla, and afterwards in their erratic wanderings over the grass; and marked down their final resting place and dug up the cocoons. At Binalong, in April, I observed two large swarms marching in massed formation: the heads of the hind rows always rested upon those in front as they moved along steadily together. Every now and then, the front rank came to a dead stop, when they all rested for three or four minutes; then a number began raising up and tapping down the tip of the abdomen, whereupon the whole band took up the motion: the leading ranks made a fresh start, and all moved along again. In the largest band, I counted two hundred and fifty caterpillars.

Larvæ that pupated in the soil in the middle of April, produced the perfect sawflies in the Insectarium in the early part of October.

The pupation of this sawfly is very remarkable. Under natural conditions, the long, oval cocoons are formed one above the other into a solid mass like honeycomb. When the full-fed larvæ are placed in a jar of sawdust, each forms a separate oval cocoon up to 1½ inches in length and ½ inch in diameter. The walls are very thin, composed of a tough, sticky, papier-maché-like material, the inner surface smooth and black, with the anterior end rounded, and the apical cut off from a false end (containing the cast larval skin loosely attached to the true cocoon) by a slightly convex partition or cap of a greyish-brown colour, except for the black centre just behind the head of the semipupa; the outer side of this cap is flat, black, and thickly impressed like the surface of a thimble.

The first moult leaves a very wrinkled, pink and yellow, naked pupa, with all the outlines of the larva, and the abdominal segments curled in underneath the hindlegs. This stage may

remain from two to three months, when the pupa undergoes a second transformation. A fine, almost black, soft but closely felted, fibrous, inner cocoon is spun, within which the pupa, now an elongate, very wrinkled, white creature, without any outlines of head or appendages, is enclosed. There must be a third change, when the typical, true pupa develops, but this has not yet been worked out. Probably, like some moths, this will not take place until a month or two before the emergence of the perfect sawfly.

Pterygophorus bifasciatus Brullé.

Hist. Nat. Insect., Hymen., Vol. iv., p. 660, Pl. 46, fig. 1, ♀, 1846.

This handsome species is easily distinguished from all the other species by the dark marking on the forewings. The type, a female, was described from Tasmania. Mr. Rowland Turner informs me that it was unique; he had never seen this insect until I sent specimens to the British Museum. My specimens were collected in the pupal state; a colony, containing about twenty cocoons imbedded in soft wood from the stem of an undetermined tree, was sent by Mr. Harold Brooks, from Dungay, Tweed River, N.S.W. The larvæ, when received in the cocoons, were in a semi-pupal state, but showed that they were typical of the genus *Pterygophorus*. The perfect sawflies emerged from the cocoons early in September.

♂. Shining blue-black, variegated with dull yellow. Length, $\frac{1}{3}$; exp. wings, $\frac{3}{4}$ inch. Head and thorax, with the exception of a yellow blotch on the sides of the latter, shining dark blue. Legs black, variegated on the tarsi. Basal half of the dorsal surface of the abdominal segments black, with the whole of the ventral surface and apical portion of the dorsal surface yellow. Forewings hyaline, richly variegated with chocolate-brown, forming a clouded costal nervure; hind and marginal band, and an outer transverse band crossing the centre of the wing, so that there are three semiopaque areas on the basal half of the wing enclosed in clouded bands. Hindwings slightly fuscous.

♀. Larger than ♂; of the same shining blue-black colour, but having the face, a large blotch on the shoulders, scutellum, post-

scutellum, and the whole of the abdomen dull yellow. Antennæ composed of eleven joints; 1st and 2nd small, 3rd-10th rounded, bead-shaped. Eyes large, projecting. Centre of the median lobe of the mesothorax with a lateral depression. Scutellum large, rounded. Length, $\frac{1}{2}$; expanse wings, $\frac{1}{2}$ inch.

Philomastix macleaii Westwood.

Perga macleaii Westwood, Proc. Zool. Soc., 1880, p. 372, Pl. xxxv., f.2, ♂. *Philomastix glaber* Froggatt, Proc. Linn. Soc. N. S. Wales, (2), Vol. v., p.489, 1890.

The type was described from a male specimen whose antennæ were wanting, and thus Westwood made the mistake of placing it in the genus *Perga*.

I have collected a large series of both sexes, with the curious double-tailed green larvæ, upon the wild raspberry-plants on the Tweed River, N.S.W. When visiting the British Museum in 1908, I went through the cabinets of sawflies, and recognised my species under the name of *Perga macleaii*.

Pterygophorus analis G. Costa.

Ann. Mus. Zool. Napoli, Vol. ii., p.66, 1864.

A number of cases have been recorded from the Roma and Mitchell districts, Southern Queensland, of the death of cattle that have acquired the abnormal habit of eating the larvæ of these sawflies. The sawflies appear in the early summer in the open forest-country in enormous numbers, and deposit their eggs on the foliage of the ironbark-trees. The resultant, long-tailed, slender, green larvæ are so numerous, that they completely strip all the foliage off the trees over a large extent of the ironbark forests. When fully fed, they crawl or fall to the ground, and congregate at the base of the tree-trunks in regular heaps.

The cattle running in infested country have acquired the habit of licking up these moribund larvæ; and quite a number of the young stock, in these particular areas, have died from their partiality to this change of diet.

Mr. Moore, the owner of "The Peaks," Marbango, Southern Queensland, has sent me the following notes. "These cater-

pillars mature on the leaves of the Ironbark-trees, and, when numerous, as they were last season (1917), do not leave a leaf on the trees. When fully matured, they come down and die all round the trunks of the trees; and it is at this stage that cattle lick them up; an overdose is fatal, particularly to young stock, such as weaners, nine to twelve months old, and calves. I fancy that acute inflammation of the bowels causes death: and the beast appears to be in terrible pain towards the end. I am inclined to think that a good deal of sand is licked up with the caterpillars, and this may add to the irritation."

"The adult sawflies emerge and are active all through April, the caterpillars feeding upon the foliage through the winter. In August, the full-grown caterpillars come down the trunks of the trees, and die in heaps; and, for about three weeks, are a danger to the young cattle in the paddocks. I think it must be a craving for salt that attracts them, and we have laid rock-salt round the trees, but once they have acquired a taste for the caterpillars they will rush round the Ironbarks to lick them up."

"I have had to remove all my cattle into the open country away from the ironbark-forest, or my losses would have been very heavy. As it was, I lost eighty head out of a mob of four hundred, sixty weaners and twenty cows. Twenty per cent. is very heavy in a week, and all the beasts that died were in splendid condition; in fact the fattest seemed to suffer most."

In my opinion, this caterpillar-pest is going to prove a very serious matter; and the only remedy will be to ringbark the ironbark-trees in some of the paddocks, so that the cattle can be kept away from the infested areas.

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